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SCIENCE AND TECHNOLOGY

OUTLINE OF ENERGY CONSERVATION TAX SYSTEM

Tokyo SHO-ENERUGI SETSUBI NO TOKUBETSU SHOKYAKU SEIDO in Japanese 10 Feb 81 pp 1-21

[Chapter 1. Outline of Energy Conservation Tax System by Energy Conservation Measures Division, Natural Resources and Energy Agency]

1-1 Establishment of the Special Depreciation System for Energy-Saving Equipment

[Text] Better and more complete energy policy being the national goal, Japan established in 1978 a special depreciation system for energy-saving equipment as one means for promoting energy conservation in industry, which is responsible for nearly 60 percent of total energy consumption.

1-2 Special Depreciation System for Energy-Saving Equipment

(1) Outline of the Special Depreciation System for Energy-Saving Equipment

Items covered by the special depreciation system for energy-saving equipment are; "machinery, newly developed or considerably upgraded in order to make a substantial contribution toward promoting effective use of not fully used energy and cutting back energy consumption, and other depreciable property which needs immediate installation. Special depreciation is recognized as an exceptional case of depreciation under the provisions of the Special Taxation Measures Law. When an enterprise acquires certain depreciable property, a certain percentage of this cost is depreciated in addition to the regular depreciation for the first year only. The total amount of depreciation does not change, but the increase in expenses or addition to losses that results from it in the first year lowers the amount taxed, therefore postponing the taxation for that amount.

The special depreciation system covers various items depending on the purpose. Specific industrial equipment whose installation should be promoted for policy reasons is covered in the special depreciation for specific equipment under Article 11 (an exception to the Income Tax Law in the case of an individual) and Article 43 (an exception to the Corporation Tax Law in the case of a corporation) of the Special Taxation Measures Law. Energy-saving equipment falls in this category and special depreciation is allowed in the first year, up to 20 percent of the acquisition cost. A summary of this follows.

1) Eligibility

Individuals or corporations that operate a business and who submit tax form printed in blue are eligible. The term "corporation" includes corporate aggregates that "have no personality" as stated in the Corporation Tax Law, that is either a corporate aggregate or a juridical foundation, which is not a corporation, and that has a designated representative or a manager.

2) Eligible Equipment

This system is applicable to equipment designated in Chart 5 of Notification No 69 of the Ministry of Finance issued on 29 May 1973. (Partly revised Notification 30 of the Ministry of Finance issued on 31 March 1980). It is limited to new equipment which was acquired, manufactured or used for business within the designated period of time indicated in the time column of the list. Equipment being rented out is excluded.

The definition of "acquired, manufactured or used for business: as stated in the Articles 11 and 43 of the Special Taxation Measures Law can be interpreted as follows.

In the case of purchased property, acquisition occurs at the time of the normal "transfer of ownership." The time of ownership transfer will be decided case by case according to the contract. In the case of property either manufactured or constructed, acquisition occurs when the construction or the manufacturing process is complete.

Its "use for business" takes place when the actual operation starts in accordance with its intended use and method for operation. However, this will be judged on an individual basis according to the nature of the equipment, the conditions of delivery stated in the purchase agreement and other circumstances.

For example, let us say some equipment is purchased under the condition that actual delivery will take place only after the completion of a test drive. When the machine is operated for testing, since the delivery theoretically has not taken place yet, it is not being used for business. However, "used for business" does not necessarily mean that a product is actually manufactured as a result of its operation. Therefore each case is dealt with individually as stated previously.

It is also applicable to cases when the equipment is being used while the payment has not been made at once and the ownership is being suspended as in the case of testing or rental.

3) Limit on Depreciable Amount

Maximum depreciable amount is earned by multiplying the purchase price by 20/100, the special depreciation rate prescribed in relation to the energy-saving equipment, and can be depreciated in addition to the regular depreciation of the first year.

4) Applicable Time Period

Applicable to the calendar year or business year, which includes the date specific equipment was purchased and used, provided the date falls within the designated time period prescribed in Chart 5 of the Notification of the Ministry of Finance.

When a deficit occurs, a carry over of 2 years for a corporation and 1 year for individuals is allowed.

5) Application Procedure

When filing a tax report, prepare a detailed statement relating to special depreciation of specific equipment and attach it to the final return form (kakutei shinkokusho). (Special Taxation Measures Law-Article 11, Paragraph 3, and Article 43, Paragraph 2). In addition to that, an individual filer should make entry related to the inclusion into expenses. (Special Taxation Measures Law-Article 11, Paragraph 3).

Furthermore, it is advisable to keep a catalog that will help prove the specifications and quality of the acquired equipment, or other records such as details of delivery, in order to ease and expedite tax investigation at a later date.

As will be explained in Chapter 3, for energy-saving equipment, related business organizations of equipment manufacturers and installers have established a "system to prove specifications and others of energy-saving equipment." Proof of specifications attached to the acquired equipment based on this system should be handed in with the tax form.

And since aforementioned proof will be used as a reference at the time of a tax investigation, a copy should be made and kept.

6) When Other Systems Can Apply

When a part or a whole of the applicable equipment falls into more than 2 categories covered in the special depreciation system for specific equipment, the one with the larger depreciation rate (partial application allowed) should be used.

This program does not apply to equipment eligible for special depreciation under different programs such as programs for industrial equipment for underdeveloped areas or equipment for small and medium sized businesses.

(2) Calculation of the Amount of Depreciation

The amount of depreciation for energy-saving equipment can be obtained by multiplying the acquisition price by 20/100 and can be specially depreciated in addition to the regular depreciation the first year.

1) Acquisition Price of the Equipment

Acquisition price of the equipment, the basis for calculating the amount of depreciation, can be obtained through the following procedure. When more than 2 pieces of equipment are acquired, the sums should be totaled.

1. When purchased: (Total of a and b)

a) Purchasing price, including transport fee for delivery, labor, moving insurance fee, handling fee, tariff and other pertinent expenses added.

b) Amount directly needed to make the equipment serviceable.

2. When manufactured or constructed: (Total of a and b)

a) Cost of raw materials, labor and other expenses needed for construction/ manufacturing.

b) Amount directly needed to make the equipment serviceable.

Property to which special exception to reduced value entry (reduced value entry bookkeeping in the case of expropriation, replacement of certain equipment, and in cases related to subsidies for change or termination of business) has been applied is not covered by this special depreciation program.

In the case of corporations owning property to which reduced value entry bookkeeping was applied to, as prescribed in the Corporation Tax Law (as in the case of reduced value entry for fixed property acquired with the aid of National Treasury Subsidy), there is no specific ordinance prohibiting the overlapping application of this system. However, in this case, the amount added into the amount of loss in reduced value entry bookkeeping should be deducted from the acquisition amount obtained following the above procedure. (1 and 2) (The Corporation Tax Law-Enforcement Ordinance-Article 54, Paragraph 3).

2) Calculation of the Amount of Depreciation

1. Corporations:

Corporations that file a blue-printed tax form (aoiro shinkoku) can choose from practically 2 methods of accounting; the direct method or the indirect method. Following is an example of a computation method.

Example:

Name of Corporation: Kasumigaseki Paper Co.

Business Year: 1 April 1980 to 31 March 1981

Equipment Acquired: Boiler using waste heat (applied to "other equipment for manufacturing paper products" from the 2nd Chart No 70 of Ministerial Ordinance related to the number of years of durability for the depreciable property. The legal years of durability is set at 10 years).

Acquisition Price: 20,000,000 yen.

Date Acquired: 1 June 1980.

Date operation started: 1 July 1980.

A) Direct Method

a. Fixed Rate Method

Amount of regular depreciation for the acquired equipment
= acquisition price x fixed rate method depreciation rate x number of months
= 20,000,000 x 20.6% x 10/12 = 3,433,333 yen ----------- A_1

Amount of special depreciation
= acquisition price x 20/100
= 20,000,000 x 20/100 - 4,000,000 yen ---------------- B_1

$A_1 + B_1$ = 3,433,333 yen + 4,000,000 yen

= 7,433,333 yen

7,433,333 yen is the amount of depreciation on energy-saving equipment for the term including March of 1981.

When there is a deficit in B_1, that is when the entire amount was not depreciated by March of 1981, the difference, after clearly figured out, can be carried over and depreciated during each term up to March of 1984. Total of A_1 and B_1 and the amount of deficit will be calculated separately for each piece of equipment.

b. Fixed Amount Method

Amount of regular depreciation for the acquired equipment
= (acquisition price - remaining amount) x fixed amount method depreciation rate x number of months
= (20,000,000 - 2,000,000) x 10% x 10/12
= 1,500,000 yen ---------------------------------- A_2

Amount of special depreciation
= 4,000,000 yen ---------------------------------- B_2

$A_2 + B_2$ = 1,500,000 yen + 4,000,000 yen

= 5,500,000 yen

5,500,000 yen is the amount of depreciation for the term including March of 1981. Deficit in B_2 amount is treated as in the fixed rate method.

B) Indirect Method (Reserve Method)

Generally, for regular depreciation of depreciable property, it is a requisite of tax law to account it as loss in that business year.

However, because of its nature, entry to loss in the case of special depreciation is not necessarily in accordance with business reality. Therefore it should be placed in the books as a depreciation reserve or as a certain amount set aside from profits. Based on this, "Special Depreciation by Reserve Deposit Method" was adopted. (Special Taxation Measures Law-Article 52-3).

This allows one to set aside an amount less than the maximum of special depreciation in installments as reserve which will be off set by including it into profit equally during 7 years following the next term. The actual computation procedure is as follows.

Amount of regular depreciation
= same as the direct method
= 3,433,333 yen (fixed rate method)
= 1.500,000 yen (fixed amount method)

Amount of special depreciation
= same as the direct method
= 4,000,000 yen

This amount should be calculated into losses through a completely different channel of accounting from depreciation. (When a certain amount is set aside from profits, it has to appear in the column of income loss in Chart 4 of Tax Report Form.)

The following describes the accounting procedures for the term of March, 1982 using the reserve method. Even when a fixed rate is used, the value in the ledger is not reduced. The maximum amount for regular depreciation is figured out and the equivalent of 1/7 of the reserve for special depreciation is added onto profits.

Amount of regular depreciation

fixed rate method = (20,000,000 yen - A_1) x 20.6% = 3,412,733 yen

fixed amount method = 18,000,000 yen x 10% = 18,000,000 yen

Amount offset in special depreciation

= reserve for special depreciation x number of months in the business year x 1/84

= 4,000,000 x 12 x 1/84 = 571,428 yen ------------------(added to profits)

571,428 yen will be added to profits during 7 years (7 terms) after the term that includes March, 1980.

As in the direct method, 3 year carry over is allowed in case a certain amount of the reserve is left over. In actual practice, since each term will produce some special depreciation reserve deposit, it is necessary to make clear distinction of the business year when accounting for it. (Tax Statement Form 16-6)

When following cases take place, the special depreciation reserve will be added to profits.

a. When terminated because of merger

Of the amount of special depreciation reserve, the amount which was not given over to the merger partner on the day of the merger.

b. When the amount of special depreciation reserve was dissolved on purpose. An amount equivalent to the amount dissolved on that particular day.

2. Individuals

Individuals submitting the tax form printed in blue can add into expenses the total amount of regular depreciation and the maximum amount of special depreciation when calculating the business income of the business year that includes the date when energy-saving equipment came into service.

The procedure to figure out the amount is the same as the direct method for corporations. However, the amount of the deficit can be carried over and depreciated during the following 2 years. (not 3 as for corporations)

(3) Reporting Procedures

Corporations have to file Form 16, a detailed statement explaining the calculation of the amount of depreciation for depreciable property (when using the fixed amount method, submit 16-1, fixed rate method, submit 16-2, and the reserve system, submit 16-6) with their final tax return. For specific equipment such as energy-saving equipment, in addition to the detailed statement (Form 16), a statement regarding the calculation of the maximum amount of special depreciation for specific equipment" has to be attached. (Forms to be used for each case same as the above)

Individuals have to describe in their final return, the addition of the depreciation amount into expenses, and those documents also have to be accompanied by "a detailed description regarding the calculation of the amount of depreciation for specific equipment."

Proof issued through the "system to prove specifications for energy-saving equipment" as described in Chapter 3 should be presented with the above records related to the tax report. (This proof is not based on law, therefore, there is no requirement to submit it. However, since the tax office refers to it, it should be submitted.)

Chart 5 Energy-Saving · Oil-Substitute-Using Equipment

(Notification No 34 of the Ministry of Finance - addition, 1978, No 27 in 1979, revised in No 30 in 1980)

No	Depreciable Property such as Machinery and Others	Time Period
1.	Heat Exchanger (limited to items that apply to one of the following)	
	1. Equipment whereby waste heat from combustion (including heat discharged from the object being heated) heats up air or fuel for combustion use. (Includes fans, used exclusively for this purpose, installed with the system)	from 1 April 1978 to 31 March 1982
	2. Equipment that utilizes cold heat that results from the vaporization of liquid natural gas. (Excludes equipment used for gas business)	same as above
	3. Total Heat Exchanger (Equipment where heat exchange with supplied air is made possible by measureable heat and latent heat from the exhaust air and which can handle over 1,000 cubic meters per hour)	same as above
	4. Heat Pipe Method Measureable Heat Exchanger (Equipment whereby heat exchange with supplied air is done by the measureable heat from the exhaust and which can handle over 2,000 cubic meters per hour)	from 1 April 1980 to 31 March 1982
2.	Boilers That Use Waste Heat (limited to items that apply to one of the following)	
	1. Equipment whereby steam is produced by waste heat from combustion (including heat descharged from the object being heated) (Includes special pump or pipes installed with the system)	from 1 April 1978 to 31 March 1982
	2. Equipment which automatically controls the amount of air and fuel in line with pressure changes in boiler, and which possesses a heat exchanger that heats up air and water provided into the boiler using waste heat of combustion created in the boiler. Only when the boiler creates less than 30 tons of rated steam per hour. (Includes pump or pipes, used exclusively for this purpose, installed with the system)	from 1 April 1980 to 31 March 1982

3. Waste-Pressure Recovery System-Equipment whereby waste-pressure gas (includes liquid form) that results from the manufacturing process is recovered and used. Applicable only wher turbines and pipes are installed at the same time. Includes automatic control system that is installed with the system.
from 1 April 1978
to 31 March 1982

4. Dehumidifier Fan System for Industrial Furnace (limited to items that apply to one of the following)
from 1 April 1978
to 31 March 1982

   1. Where lithium chloride and other moisture absorbents are used to dehumidify. Dehumidifier, regenerator, pump and pipes specifically used for this purpose are included.

   2. System whereby moisture is absorbed by cooling the air supply. Includes freeser, air cooler, heat exchanger, cool water tank, pump and pipes specifically used for this purpose.

   3. System which combines the above 2 including additional equipment mentioned above.

5. Energy-Saving Industrial Furnace (limited to items that apply to one of the following)
from 1 April 1978

   1. Among furnaces with an internal temperature of above 500°, those where the preheating unit which is used to preheat raw material using waste combustion heat, is connected to the unit that heats the furnace and where waste gas temperature and furnace temperature have a difference of over 150° by way of heat exchange.

   2. For furnaces of over 500° temperature that are newly built, those where more than 50% of the inside area, excluding the bottom, is made of insulation material with a bulk unit weight of less than 1.3.

   3. Those with a mechanism that automatically controls the ratio of combustible air and fuel flow in accordance with changes in furnace temperature and amount of combustion.

   4. Those using an injection combustion method, with an injection speed of over 50m/second.

6. Cupola Furnace With Divided Fanning System (limited to models where combustible air is blown in from more than 2 air vents, including the air control system installed with the system.
from 1 April 1980
to 31 March 1982

7. Steam Drain Recovery System (that is used to collect and reuse steam drain after the first use. Limited to only when steam trap, drain pump and pipes are installed at the same time. Includes special drain filter and drain tank installed with the system).
from 1 April 1978
to 31 March 1982

8.	Steam Accumulator (that is used to stabilize the load change in the boiler that results from a change in the amount of steam used. Limited to models where steam retention or vaporization, according to the amount of steam used, is done automatically.	from 1 April 1978 to 31 March 1982
9.	Improved Due-Purpose Absorbing Type Water Heater/Cooler (Limited to systems whereby while lithium bromide liquid or other absorbent liquid is being regenerated more than twice in its circulation process, the waste heat coming from the liquid's regeneration or condensation process either produces warm water or preheats combustible air or the absorbent liquid. Includes special plumbing installed with the system.)	from 1 April 1980 to 31 March 1982
10.	Cold Box Casting Mold Forming Machine - It hardens the casting sand by way of the chemical hardening reaction of organic bond material (except for a combusion reaction) using amine gasses as catalyst, and has a casting frame area larger than 0.09 square meter. (It is limited to those molding machines which have a core weighing more than 1 Kg.)	from 1 April 1978 to 31 March 1982
11.	Heat Source System That Uses a Heat Pump - Air conditioners or chilling unit (limited to those with reciprocating or rotary compressor) that uses a heat pump, with a total rated electric power consumption of over 30 kilowatts. Includes special plumbing for heat collection, pipes and heat storage tank that are installed with the system.	from 1 April 1978 to 31 March 1982
12.	Insulated Wall of a Storage Tank - Insulation that is attached to the outer wall of the steel storage tank, which has a system by which the stored item is heated. Limited to the ones consisting of insulating material of over 10mm thickness with a thermal conductivity of less than 0.1 kilocalorie per hour, per meter and per degree.	from 1 April 1978 to 31 March 1982
13.	Generator That Utilizes Waste Heat at Low to Medium Temperatures - System that generates electricity using waste heat from the manufacturing process. Limited to those where the temperature at the entrance to the evaporator is over 500°, excluding ones used for electrical operations. Applicable only when evaporator, turbine, generator, compressor, pump, plumbing and automatic control system are installed at the same time. Includes preheater (limited to those that preheat heating medium by using the above-mentioned waste heat) or a heat storage tank installed with the system.	from 1 April 1980 to 31 March 1982
14.	High Efficiency Radiator Heater (limited to items that apply to one of the following)	from 1 April 1980 to 31 March 1982

14. 1. System where the heat, created by combustion, is radiated through a tube directly connected to the system where combustion takes place. Limited to systems where over 10,000 kilo calorie combustion can take place per hour and applicable only when the combustion system, tube, reflecting board are installed at the same time. Includes automatic control system, fan or vacuum pump installed with the system.

    2. System where the floor, heated with electricity or warm water, radiates heat. Applicable only when heat generator, heat storage board (whose total area is over 100 square meter), and adiabatic board are installed at the same time. Includes an automatic control system, pump and plumbing installed with the system.

15. Electric Power Load Control System (limited to items that apply to one of the following) — from 1 April 1980 to 31 March 1982

    1. The system that controls electric power load by automatically opening and closing a circuit connected to a system that only uses a designated amount of electricity according to a planned procedure. Applicable only when the electric power monitoring device and automatic control system are installed at the same time. Includes special detector or relay installed with the system.

    2. Rotation (frequency) control system that regulates electric power load by automatically changing the rotation frequency of the motor's output spindle in accordance with the power needed by the motor driven equipment, or a speed changing system that does the same by changing the spindle's rotation frequency with the use of a hydraulic coupling. Includes special automatic control system, detector, switch or a transformer installed with the system.

    3. System that regulates electric power load with automatically controlled lighting, regulated by a control command signal transmitted in accordance with a pre-arranged program. Limited to when special light control system and device which switches the light on and off or adjusts it are installed at the same time. Includes wiring for signal transmission installed with the system.

16. Diesel Engine for Ship - Applies when the diesel engine replaces a steam burbine used as the main locomation of a ship. (Either container ships of over 40,000 total tonnage or oil tankers with a total tonnage of over 100,000, that have been launched after 1 June 1971 are covered.) Only diesel engines which will be the main locomotion and fuel consumption rate of which is less than 155 g per hour are applicable. Speed reducing device installed with the system is included. — from 1 April 1980

17.	Heating and Cooling System Using Solar Energy - System equipped with a solar energy collector or more than 50 square meters surface. Applicable only when solar energy collector, heat storage tank, auxiliary heat source, automatic control, plumbing and pump or fan are installed at the same time. Includes freezer or cooler driven by warm water heat absorbing system or Rankin cycle engine.	from 1 April 1978 to 31 March 1982
18.	Coal Burning System - System which can burn more that 1.5 tons of fine powder coal per hour. Ones used for electrical operations are excluded. Applicable only when burner, automatic coal supply system, coal pulverizer and fan are installed at the same time. Includes coal dryer used exclusively for this purpose installed with the system.	from 1 April 1980 to 31 March 1982
19.	Hydro Power Electric Generator - Used for hydro-electric generation of more than 1,000 kw of maximum output. Applicable only when a water wheel, speed governor, water control valve are installed at the same time.	from 1 April 1980 to 31 March 1982
20.	Electric Generator Using Terrestial Heat - Those used to generate more than 1,000 kw of maximum electrical output. Applicable only when condenser and cooling tower are installed at the same time and include its own pump or plumbing, (from turbine to condenser, from condenser to cooling tower, or from condenser or cooling tower to connecting pumps.)	from 1 April 1980
21.	Chip Burning System (limited to items that apply to one of the following) 1. Chip burning boiler-boiler that uses chips as fuel and produces more than 1 ton of steam per hour. Includes pump or fan installed with the system. 2. Chip burning hot air generator-heat generator that uses chips as fuel. Includes special fan installed with the system. Limited to those that produce more than 2,000 m^3 of hot air per hour with a temperature of over 150^0 when leaving the hot air mixing room.	from 1 April 1980 to 31 March 1982
22.	Hot Air Generator Using Agricultural By-Products - Mainly those that generate hot air by burning chaff. Limited to those that can burn more than 500,000 kilocalorie per hour. Applicable only when chaff burning system, chaff provider and fan connected to them are installed at the same time. Includes heat exchanger and fan or cinders cooling system connected to it.	from 1 April 1980 to 31 March 1982

Note - 1 "When -------- are installed at the same time" in the Notification of the Ministry of Finance basically means that more than two pieces of equipment are installed consecutively before they are used for business and does not mean that they are installed physically "simultaneously." Therefore it is applicable when more than 2 pieces of equipment are installed at a reasonable interval in the same business year, within the designated time period.

Note - 2 "Limited to XXXXX and includes YYYYY installed with the system" means that designated equipment is limited to XXXXX but when YYYYY are installed at the same time, YYYYY also become the objects of depreciation. YYYYY will not be covered when only XXXXX are installed or YYYYY are installed after a considerable amount of time after the installment of XXXXX.

Form 16-1 (When fixed amount method is used)

Form 16-1 Size of paper; Japanese Industrial Standard B5

Detailed statement regarding calculation of amount of depreciation using fixed amount method.

1. Business Year

2. Name of Corporation

A. Property
   1. Type
   2. Structure
   3. Details
   4. Date put into service

B. Acquisition Price
   5. Purchase or manufacturing cost (yen)
   6. Mortgage amount using reduced value entry
   7. Adjusted acquisition cost (5) minus (6)
   8. Remaining amount

C. Price in Ledger
   9. Price in ledger as of the end of the term
   10. Mortgage amount as of the end of the year
   11. Mortgage amount paid back during the term
   12. Adjusted price in ledger (9) minus (10) minus (11)
   13. Basic amounts used to calculate amount of depreciation using the fixed amount method
   14. Number of years of durability (number of years)
   15. Depreciation rate

D. Maximum amount of depreciation for this term

   a. Maximum amount of regular depreciation incurred this term

   16. Calculated amount of depreciation (13) x (15) (yen)
   17. Increased amount of depreciation (16) x addition rate
   18. Total

   b. Maximum amount of special depreciation

   c. Additional depreciation

   19. Applicable provisions from the Special Taxation Measures Law (number of provision)
   20. Accelerated depreciation (yen)

   d. Special depreciation

21. Applicable provisions from the Special Taxation Measures Law (number of provision)
22. Special depreciation (yen)
23. Total (20) + (22) ("other")
24. Deficit for depreciation carried over from the preceding term
25. Total (18) + (23) + (24)
26. Amount of depreciation for this term

E. Differences

27. Deficit for depreciation (25) minus (26)
28. Excess amount of depreciation (26) minus (25)

F. Excess amount of depreciation

29. Amount carried over from the preceding term

a. Acknowledged amount of loss for this term

30. Amount due to too little depreciation
31. Amount due to mortgage pay back
32. Adjusted total amount carried over to the following term (28) + (29) minus (30) minus (31)

G. Depreciation Deficit

33. Deficit amount to be carried over to the following term - the smaller of (27) minus (30) or (23) + (24)
34. Amount of deficit of depreciation cut off during this term
35. Adjusted amount to be carried over to the following term (33) minus (34)

a. Breakdown of the amount carried over to the following term

36. Date
37. Date
38. Date
39. Date
40. Date
41. Deficit for this term

H. Remarks

Directions for Form 16-1

1. This form should be filled out when the corporation uses the fixed amount method to determine the maximum amount of depreciation for its depreciable property. When the provisions of the Special Taxation Measured Law concerning special depreciation apply, (excluding Article 49, Paragraph 1 - special depreciation for coal mining tunnel - and Article 50, Paragraph 2 - special depreciation of afforestation cost. The same for Paragraphs 6 and 7 of "Directions for Form 16-1) the pertinent explanation regarding calculation of the maximum amount special depreciation should be written on a separate sheet of paper and attached to this form.

2. (1) Type, (2) Structure and (3) Details should be filled in according to those stipulated in the Ministry Ordinance Chart 1 to 9 concerning the number of years of durability of depreciable property.

3. (4) Date put into service: Put down the date, during the business year, that the equipment was put into service. However, when Article 59, Paragraph 2 (simplified calculation for machinery and equipment) applies, put down "Acquired during term."

4. (8) Remaining amount: Put down an amount equivalent to 5/100 of (7) Adjusted acquisition cost of (the tangible fixed) property only for tangible depreciable property.

5. (17) Increased amount of depreciation: Put down increased depreciation rate stipulated in Article 60 - rate of increased depreciation.

6. In the accelerated depreciation (20), put the special depreciation limit amount according to the stipulation (it includes the stipulations of Special Taxation Measures Law - Article 49, Paragraph 2 - wind tunnel, etc. accelerated depreciation. In the next section it is called the "accelerated depreciation stipulation.") regarding accelerated depreciation, among the stipulations for special depreciation according to the Special Taxation Measures Law. Put within the parentheses of the same line that special depreciation rate.

7. (22) Special depreciation: Put in the amount of special depreciation stipulated by other provisions than the stipulation concerning accelerated depreciation that are included in the Special Tax Measures Law, and put down the rate of depreciation in the parentheses.

8. Column (23): Put down the amount in where it says "other" when Article 52, Paragraph 3 - special depreciation through reserve method - of the Special Taxation Measures Law applies.

9. For things that are covered in Article 63, Paragraph 2 - detailed statement concerning depreciation: If the total amount as stipulated in that provision is indicated, entries from (2) to (4), (8) to (11), (14), (15) and from (36) to (41) are not necessary.

Form 16-2 (When fixed rate method is used)

Form 16-1 Size of paper; Japanese Industrial Standard B5

Detailed statement regarding calculation of amount of depreciation using fixed rate method.

1. Business Year

2. Name of Corporation

A. Property
   1. Type
   2. Structure
   3. Details
   4. Date put into service

B. Acquisition Price
   5. Purchase or manufacturing cost (yen)
   6. Mortgage amount using reduced value entry
   7. Adjusted acquisition cost (5) minus (60
   8. Remaining amount

C. Basic amounts used to calculate amount of depreciation using fixed rate method
   9. Price in ledger as of the end of the term
   10. Mortgage amount as of the end of the year
   11. Mortgage amount paid back during the term
   12. Adjusted price in ledger (9) minus (10) minus (11)
   13. Amount of depreciation for this term that was added to losses
   14. Exessive amount of depreciation carried over from the preceding term
   15. Deficit of depreciation carried over from the preceding term
   16. Difference (12) + (13) + (14) minus (15)
   17. Number of years of durability (number of years)
   18. Depreciation rate

D. Maximum amount of depreciation for this term

   a. Maximum amount of regular depreciation incurred this term

   19. Calculated amount of depreciation (16) x (18) (yen)
   20. Increased amount of depreciation (19) x addition rate
   21. Total

   b. Maximum amount of special depreciation

   c. Additional depreciation

   22. Applicable provisions from the Special Taxation Measures Law (number of provision)
   23. Accelerated depreciation (yen)

d. Special depreciation

24. Applicable provisions from the Special Taxation Measures Law (number of provision)
25. Special depreciation (yen)
26. Total (23) = (25) ("other")
27. Deficit for depreciation carried over from the preceding term
28. Total (21) + (26) + (27)
29. Amount of depreciation for this term

E. Differences

30. Deficit for depreciation (28) minus (29)
31. Excess amount of depreciation (29) minus (28)

F. Excess amount of depreciation

32. Amount carried over from the preceding term

a. Acknowledged amount of loss for this term

33. Amount due to too little depreciation
34. Amount due to mortgage pay back
35. Adjusted total amount carried over to the following term (31) + (32) minus (33) minus (34)

G. Depreciation Deficit

36. Deficit amount to be carried over to the following term - the smaller of (30) minus (33) or (26) + (27)
37. Amount of deficit of depreciation cut off during this term
38. Adjusted amount to be carried over to the following term (36) minus (37)

a. Breakdown of the amount carried over to the following term

39. Date
40. Date
41. Date
42. Date
43. Date
44. Deficit for this term

H. Remarks

Direction for Form 16-2

1. This form should be filled out when the corporation uses the fixed rate method to determine the maximum amount of depreciation for its depreciable property. When the provisions of the Special Taxation Measures Law concerning special depreciation apply, (excluding Article 49, Paragraph 1 - special depreciation for coal mining tunnel - and Article 50, Paragraph 2 - special depreciation of afforestation cost. The same for Paragraphs 6 and 7 of "Directions for Form 16-2) the pertinent explanation regarding calculation of the maximum amount for special depreciation should be written on a separate sheet of paper and attached to this form.

2. (1) Type, (2) Structure and (3) Details should be filled in according to those stipulated in the Ministry Ordinance Chart 1 to 9 concerning the number of years of durability of depreciable property.

3. (4) Date put into service: Put down the date, during the business year, that the equipment was put into service. However, when Article 59, Paragraph 2 (simplified calculation for machinery and equipment) applies, put down "Acquired during term."

4. (8) Remaining amount: Put down an amount equivalent to 5/100 of (7) Adjusted acquisition cost of (the tangible fixed) property only for tangible depreciable property.

5. (20) Increased amount of depreciation: Put down increased depreciation rate stipulated in Article 60 - rate of increased depreciation.

6. In the accelerated depreciation (23), put the special depreciation limin amount according to the stipulation (it includes the stipulations of Special Taxation Measures Law - Article 49, Paragraph 2 - wind tunned, etc. accelerated depreciation. In the next section it is called the "accelerated depreciation stipulation") regarding accelerated depreciation, among the stipulations for special depreciation according to the Special Taxation Measures Law. Put within the parentheses of the same line that special depreciation rate.

7. (25) Special depreciation: Put in the amount of special depreciation stipulated by other provisions than the stipulation concerning accelerated depreciation that are included in the Special Tax Measures Law, and put down the rate of depreciation in the parentheses.

8. Column (26): Put down the amount in where it says "other" when Article 52, Paragraph 3 - special depreciation through reserve method - of the Special Taxation Meausres Law applies.

9. For things that are covered in Article 63, Paragraph 2 - detailed statement concerning depreciation: If the total amount as stipulated in that provision is indicated, entries from (2) to (4), (8) to (11), (13) to (15), (18) and (39) to (44) are not necessary.

Form 16-6 (When the reserve method is used)

Form 16-6: Detailed statement regarding the addition of the money set aside in installments for special depreciation (reserve method) into losses. The size of form: JIS (Japanese Industrial Standard) B5

1. Business Year

2. Name of Corporation

1. Type of special depreciation
2. Installment for this term (yen)

a. Maximum amount of installment for this term

3. Maximum amount of depreciation for this term
4. Deficit of installment carried over from the preceding term
5. Maximum amount set aside in installments (3) + (4)

b. Difference

6. Excess over the maximum amount set aside in installments
7. In the case of accelerated depreciation
8. In the case of the 1st year depreciation

c. & d. Deficit in amount set aside in installments

9. Deficit to be carried over to the following term
10. Deficit to be cut off during this term
11. Revised amount carried to the following term (9) minus (10)

e. Breakdown of the amount carried over to the following term

12. Date
13. Date
14. Date
15. Date
16. Date
17. Amount for this term (7) or (8)
18. Total sums of 12 through 17

f. Calculation of amount added to profit

g. Business year installment took place

h. (19) The amount added to losses from the beginning installment

i. (20) Amount of money set aside at the beginning of the present term

j. Amount added to profit this term

k. (23) Amount carried over to the following term (20) minus (21) minus (22)

l. (21) When dissolved in equal amounts (19) x $\frac{\qquad\qquad}{84 \text{ or } 120}$)

m. (22) Cases not covered by (21)

n. Date

o. For this term

p. Total

(19) - (23) unit yen

Directions for Form 16-6

1. This form should be filled out when Article 52, Paragraph 4 - special depreciation using reserve method - of Special Taxation Measures Law applies to corporations. This detailed statement should be written out on separate sheets for each different type of special depreciation.

2. (3) Maximum amount of installment for this term: Put down the total of amounts that appear in "other" in the column of "maximum amounts of special depreciation" of forms 16-1 to 16-4.

3. 1-(21) "19 x $\frac{\qquad\qquad}{84 \text{ or } 120}$": Put the amount of money set aside for special depreciation during the business year and calculate. When it ends after 1 April 1976, use 84 and before 1 April 1976, use 120.

Additional Form - relating to the calculation of amount of depreciation for specific equipment - (Special Taxation Measures Law 43, 44 Ordinance 28, 28-2)

Business Year Name of Corporation

1. Specific property categories (applicable ordinance number)

2. Type of business

3. Type of specific equipment (put number from the chart indicating the years of durability for machine or equipment)

4. Name of specific equipment

5. Name of factory or office installed

6. Date put into service

7. Bought from

8. Purchase price (yen)

9. Rate of special depreciation

10. Maximum amount for special depreciation (yen)

a. Computation for exceptions for small and medium businesses

11. Amount of depreciation (8) $\times \dfrac{90}{100} \times \dfrac{\text{number of months served for business}}{\text{36 or 60}}$

12. Amount for regular depreciation

13. Amount for special depreciation

14. Depreciation or reserve method

b. Depreciation
Reserve deposit

15. Other pertinent information: Information important in making judgement, such as specifications and capabilities of specific equipment used for business.

Directions for Additional Form

1. Please fill in the pertinent information concerning the computation of the special depreciation amount and submit with Form 16 when Special Taxation Measures Law - Article 43 (special depreciation for specific equipment) or Article 44 (exception to the special depreciation for pollution protection equipment for small and medium businesses) apply, or when, instead of the above, the stipulation of Article 52-3 (reserve method for handling special depreciation) applies.

2. (1) Specific property categories: Put down the number of the category it falls into from the chart in Special Taxation Measures Law, Article 43, Paragraph 1.

3. (2) Type of business: Put down the type of business which the equipment is used for.

4. (3) Type of specific equipment: Put down "types," "categories," "machinery and other equipment," "specific railway construction" and "building construction" from the chart in notification regarding specific equipment. (Notification No 69, 1973 and others of the Ministry of Finance) When the specific equipment is a piece of machinery, choose the number that corresponds with the number of years of durability from the chart of Ministerial Ordinance and put it down in parentheses.

5. (4) Name of specific equipment: Put down the name that corresponds to the specific equipment's listing.

6. (9) Rate of special depreciation: Put down rate that corresponds to that on the chart from Article 43, Paragraph 1 of the Special Taxation Measures Law.

7. (11) Amount of depreciation: Erase 36 (use 60) when the equipment was acquired after 1 April 1978. Erase 60 (use 36) when acquired before then.

8. (14) Depreciation or reserve method: Circle the method used to handle the maximum amount of special depreciation.

9. (15) Other pertinent information: Put down, as concretely as possible, information that would help in proving that the specifications and functions of the acquired equipment do correspond with those described in the notification from the Ministry and therefore can be regarded "specific equipment."

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PROGRESS OF NATIONAL PETROLEUM STOCKPILE PROJECTS REVIEWED

Tokyo TSUSAN JANARU in Japanese Jul 81 pp 102-110

/Article by Tokuzo Ikeda, chief, Stockpile Planning Division, Japan Petroleum Development Corporation/

/Text/ How Far Have Stockpiling Efforts Progressed in Japan Where Increased Oil Stockpiling Is of Great Urgency

Basis of Safety Assurance--Positioning World Trends and Oil Stockpiling

Trends of Oil Producing Countries Which Increase Instability

The energy revolution which has been taking place since World War II has caused great changes in the energy consumption structure and during the past 30 years this has resulted in the primary energy source of the world's major companies been replaced for the most part by oil.

On the other hand, the fourth Middle East War (October 1973) was the wedge which precipitated the first oil crisis and resulted in the oil producing companies, particularly OPEC, undertaking to reinforce its market controlling power and bringing about a number of changes in the oil price and handling routes (increase in D-D crude oil, G-G crude oil).

In addition, during the past year the situation in the Middle East, which is the largest oil producing area, has been unpredictable in nature due to increased instability in these oil producing countries as evidenced by the Iranian revolution of 1978, followed by the Iranian-Iraqi confrontation, and the net result has been that most recently the world's energy picture has intensified in its stability.

In another direction, when future oil supplies are reviewed, just as is the case with all other forms of fossil energy, it will be realized that oil resources are finite so that an oil production limitation will be attained along about 1990, after which oil production is expected to decrease gradually and a greater stringency in the oil supply and demand picture cannot be avoided (according to the IEA /International Energy Agency/ estimates of oil supply and demand of the free world, assuming the production capacity of OPEC will have hit its peak, there will be a supply insufficiency of 4.2 million B/D in 1985 /compared to demand of 58 million B/D/ and insufficiency of 6.6 million B/D in 1990 /compared to demand of 61.7 million B/D/).

Brittle Oil Supply Base of Japan and Energy Safety Assurance

In the midst of the world's situation, Japan depends on oil to provide more than 3/4 of its primary energy, and furthermore 99.8 percent of this oil is obtained by import (imports from the Middle East countries accounts for about 80 percent). The fraction of total imports accountable to oil is 72.1 percent which is far more than the oil and coal producing countries such as the United States and the United Kingdom use, and a comparison with certain European countries whose situation is similar to Japan's such as Germany show Japan's oil import dependence is far greater. In other words, there is no other country in this world which has to depend so much on imported oil. When combined with the aforementioned political instability of the Middle East, it can be said that Japan's energy supply situation is in a very sensitive and unstable state. This is all the more reason why Japan's energy safety assurance system needs to be established quickly, and this is the most urgent subject facing the Japanese.

Now, needless to say, in order to establish energy safety assurance, we must plan to disengage ourselves from this great dependency on oil through measures such as promotion to oil exploration, substitute energy development, and promotion of energy conservation measures. On the other hand, the promising oil substitute energy forms such as nuclear fusion, solar energy, or hydrogen are all still in early research stages, and it is estimated that it will be at least in the 21st Century before technological developments will have progressed to the state that effective use can be made of these sources. Where energy conservation is concerned, the readily practiced processes have already been tested, and what is left is development of new energy conservation technology and large capital expenditure for energy conservation. But conservation of energy, just as substitute energy, is not a basic solution to the oil insufficiency problem, and there is a self-generated limit. This is why when one considers the substitute energy development picture, there is no other course but to depend on oil to supply our needs in the near future.

As discussed above, when the various restrictions are taken into account, the subject of establishing energy safety assurance can be considered in the following manner. In other words, where the urgency of the mid- and long-term oil demand and supply situation is concerned, it is important that development of oil substitute energy and energy conservation measures be promoted as much as possible. At the same time, dependence on the politically unstable Middle East should be reduced, and all efforts directed at diversifying oil sources. Concerning the aforementioned battle situation involving the Middle East oil producing countries, the most effective countermeasure against such sudden changes is to increase as much as possible the volume of stockpiled oil. Oil stockpiling is expected to assume even greater importance as the political situation of the Middle East deteriorates.

Measures Taken by the European Countries

This need for stockpiling of oil has been recognized in the different European countries at a fairly early stage, and formerly there was an international effort in this direction spearheaded by the OECD, but at a meeting of the directors of OECD on November 1974 the International Energy Plan (IEP) was drawn up, and the promotion of this plan was assigned to a self-governing organ within the OECD framework called IEA. IEA set up a goal of a 90-days supply stockpile for each of the participating countries by 1990 and also has engaged in various emergency oil financing systems and the establishment of international oil stockpiling activities.

Incidentally, the stockpiled level of these principal countries as of 1 July 1980 averaged the high level of 140 days supply among the IEA. At the same time, the United States has embarked on a course to ease the impact of decreased oil supply and to uphold its part in the IEA by putting into its petroleum strategic reserves 750 million bbl (120 million kiloliters) by 1989.

Japan's Petroleum Stockpile

The stockpiling system of Japan at the present time is comprised of the two main pillars of private stockpiling under the oil stockpiling law and the national stockpile being amassed by the Petroleum Public Corporation. The oil stockpiling is being carried out primarily from the standpoint of safety assurance of the country's economy, and when the national significance, vast capital, and cost burden are considered, it is basically an obligation of the country to take on this responsibility. On the other hand, in view of the need for smooth handling in times of emergency and the use of various experiences accumulated by the private oil industry in handling oil, it was decided to let the oil industry which normally handles the country's oil supply conduct this service as a function of the powerful subsidy management of the country. As a result, stockpiling duties were assigned to the refining industry based on the oil stockpiling laws which went into effect in 1975, and a reinforcement of planned stockpiling was promoted which succeeded in attaining a 90-day reserve level by JFY 1980. On the other hand, when the sensitive nature of Japan's oil supply structure, the recent governmental instabilities in the Middle East countries, and the high level of oil reserve stockpile attained by the Western countries are reviewed, it becomes clear that a 90-day stockpile for private use is not sufficient. When seen from this viewpoint, it was decided that Japan should have a stockpile at least on a par with the Western countries, and the portion over that of the 90-day supply of private oil was assigned to the Petroleum Public Corporation, and a national stockpile was started in JFY 1980. The present status and future plans of this national oil stockpile are discussed below.

At the present time, the Petroleum Public Corporation is targeting a national oil stockpile of 30 million kiloliters by the end of JFY 1988. If 30 million kiloliters are actually to be put in storage, it will require the addition of 2.5-3.0 million kiloliters per year from now on and this amounts to about a 44 million kiloliter equivalent where stockpiling base facilities are concerned (this will require 10 sites each with capacity of 4.0-5.0 million kiloliters) on a facility capacity base (stockpiling rate of about 70 percent).

Now, the path of this national stockpiling structure is not always smooth. All-out cooperation on the part of the neighborhood people is a must for promotion such a large-scale project, and it is extremely difficult to realize these conditions under the present situation. The Oil Public Corporation has thus far conducted three rounds of FS (feasibility studies) to seek out possible sites for only one stockpiling location. The prospective candidates were required to fulfill the following specific conditions. 1) The site is feasible from the standpoints of technology and economy, 2) there is a promotion system centered on key industries which will actually handle the construction operations of the base, and 3) initiation of operations starting from those sites at which local surveys have started. At the present time, Ogawabara in Mutsu, eastern Tomokomaki, the Shirojima projects are making the shift to actual operation. Although no optimistic evaluation on future directions can be projected, possible projects are being reviewed one after the other. The following are some of the projects which are being studied as possible candidates.

1) Akita Project (third set FS candidate)
Site: Funakawa District, Oga-shi, Akita-ken
Site area: about 100 hectares
Capacity of stockpiling facility: about 5-7.5 million kiloliters

This project should be noted as Japan's first oil storage using underground tanks.

2) Niigata Project (third set FS candidate)
Site: Coastal industrial belt at Higashi Minato, Niigata Prefecture
Site area: about 140 hectares
Capacity of stockpiling facility: about 3.36 million kiloliters

There is a base of the Niigata Joint Oil Stockpile (Co) at the coastal industrial belt of Higashi Minato in Niigata Prefecture for which the Petroleum Public Corporation has advanced capital.

3) Fukui Project (was deemed feasible in the first set FS)
Site: Fukui-shi and Sangoku-machi in Fukui-ken
Site area: about 150 hectares
Stockpiling capacity: about 3.3 million kiloliters

This is the site at which reclamation work was initiated to construct a base for Fukui-ken in June 1981.

4) Kami Goshima Project (was deemed feasible in the first set FS)
Site: Aogata Port, Nakadori Island, Goshima Islands, Nagasaki-ken
Area: Land area: about 10 hectares
Sea area: about 40 hectares
Capacity of stockpiling facility: about 6 million kiloliters (7 floating tanks each of 800,000 kiloliters capacity)

This is where agreement was reached with the related fishing cooperatives on fishing rights in June 1981.

5) Shibushi Project (third set FS candidate)
Site: Shibushi Port, Kagoshima-ken
Site area: 120-240 hectares
Capacity of stockpiling facility: 5-10 million kiloliters

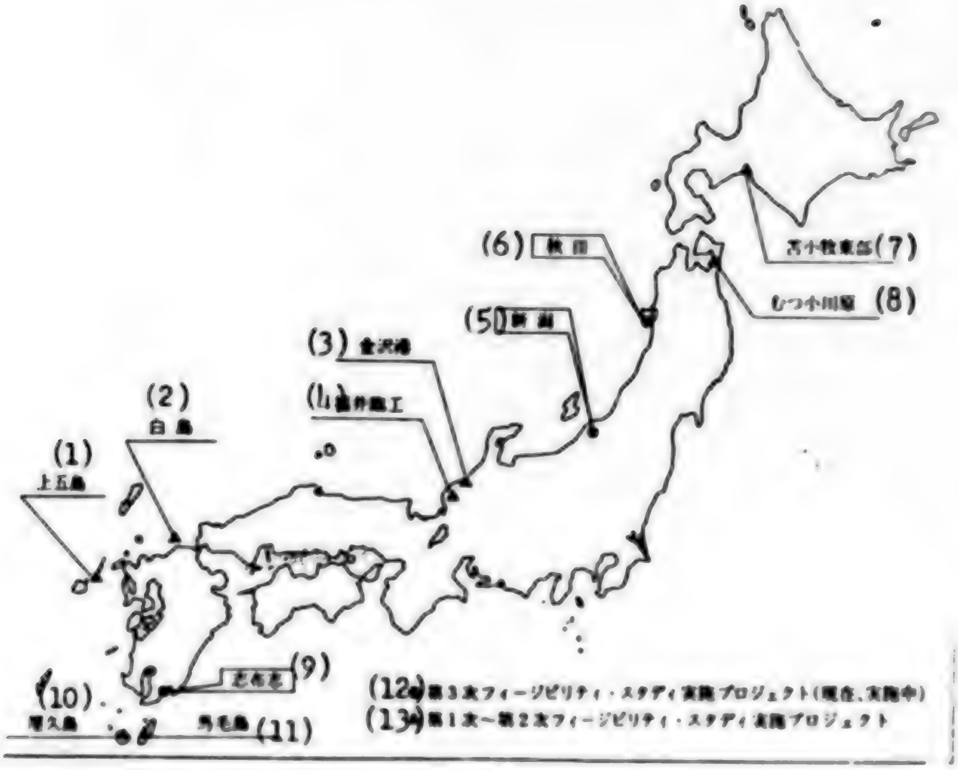
Since the Shibushi shoreline is part of a national part, studies are underway to blend the stockpiling base in with the natural background.

In addition, research is underway on an entirely different underground storage different from the tank mode used in the past, and demonstration experiments will be underway for which Kikuma in Ehime-ken, Kushikino in Kagoshima-ken, and Kuji in Iwate-ken are candidates.

Large-Scale Land Based Stockpiling Bases

The Mutsu Ogawabara Project is one which has been promoted as a large-scale industrial base under the New All Japan Comprehensive Development Plan which was drawn up in 1969. The area coming under the land utilization plan for this industrial base is about 5,000 hectares, and nearly all of this land has already been purchased. It is in the position that once construction is completed it can be used immediately as an industrial base. This industry has not developed, as expected, along with the stable growth in Japan's economy. This area had long sought to be effectively utilized, and here was a good match between the local situation and the urgency for a national stockpiling base construction so it was selected as the first site for construction of a national stockpiling base. About 260 hectares of this land area will be utilized to construct a permanent base for about a 5.7 million kiloliter storage, but the main plan of this industrial scale, unprecedented in the northeast region, is significant not only because it is the first national stockpiling base but it is the spearhead of industrial development in this area.

Figure 1. Map of Possible Sites Under Survey


(1) 上五島
(2) 白島
(3) 金沢港
(4) 福井臨工
(5) 新潟
(6) 秋田
苫小牧東部 (7)
むつ小川原 (8)
志布志 (9)
(10) 屋久島
馬毛島 (11)
(12) ● 第3次フィージビリティ・スタディ実施プロジェクト(現在,実施中)
(13) ▲ 第1次～第2次フィージビリティ・スタディ実施プロジェクト

Key:
1. Kami Goshima
2. Shirojima
3. Kanazawa Port
4. Fukui coastal area
5. Niigata
6. Shibushi
7. eastern Tomakomaki
8. Mutsu Ogawabara
9. Shibushi
10. Yakujima
11. Magejima
12. ● Execution project from 3rd set feasibility study (presently under construction)
13. ▲ Execution project from 1st and 2nd set feasibility studies

The following is an outline of this project.

Stockpiling mode: above ground steel tanks
Capacity of stockpiling facility: about 5.7 million kiloliters (51 tanks each of 110,000-200,000 kiloliters)
Area: about 260 hectares
Construction cost: about 136 billion yen
Expected completion: one section completed by end of JFY 1982
totally completed by end of JFY 1983

The Mutsu Ogawabara Oil Stockpiling (Co) was set up with Toa Oil (Co) as principal party to construct and operate this stockpiling facility, and this new firm is getting ready to start its operations.

The eastern Tomakomaki Project is a large-scale oil stockpiling base adjacent to the Hokkaido Joint Stockpile Project under joint operation of the Petroleum Public Corporation and private industry, and once these two projects are completed, it is expected they will provide the world's largest oil storage base which will even exceed the Rotterdam facility.

The following is a general outline of this project.

Stockpiling mode: above ground steel tanks
Capacity of stockpiling facility: about 6.2 million kiloliters (55 x 110,000 kiloliter units)
Area: about 286 hectares
Construction cost: about 150 billion yen
Expected completion: southern sector completed by end of JFY 1983
northern sector completed by end of JFY 1985

The Tomakomaki Eastern Oil Stockpile (Co) was formed with Shukko Kyosan (Co) as principal party to construct and operate this stockpiling facility and is about to start operations.

World's First On-Sea Stockpiling Base--Shirojima

The Shirojima On-Sea Oil Stockpiling Base is a floating type structure (floating tank mode) which will be the first on-sea oil stockpiling system.

The Oil Public Corporation has been engaged for some time in feasibility studies on this system enlisting the cooperation of the Safety Engineering Society, Japan Shipbuilding Technology Center, and the Japan Harbor and Bay Association to plan this base, and it was concluded at the January meeting of the National Oil Stockpiling Base Plan Study Committee that this plan is both economically and technologically feasible. At the same time, agreement was reached with the local governments of Fukuoka-ken, Kita Kyushu-shi, Yamaguchi-ken, and the local fishing cooperatives, and the Shirojima Oil Stockpile (Co) which will be the main promotional body was formed on 8 June.

The following is a general outline of this plan.

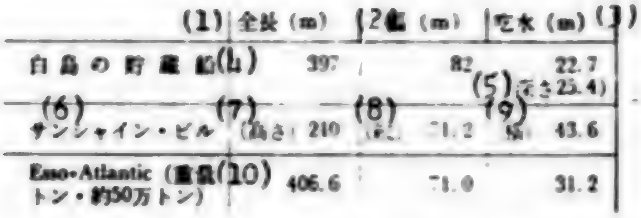
Planned site: Shirojima seacoast, Wakamatsu-ku, Kita Kyushu-shi
Stockpiling mode: floating tank mode
Capacity of storage facility: about 5.60 million kiloliters
Number and capacity of storage vessels: about 700,000 kiloliters x 8 vessels
Required area: land area: (land facility) about 14 hectares
sea area: (vessel mooring area) about 60 hectares

The appearance of this base on completion is shown in Fig 2.

The deployment plan provides for filling in of the eastern sea area of Shirojima (Otokojima) where the control facility, service facility, and waste water treatment facility will be located. An enclosed docking area completely shielded from the sea will be provided through this fill-in and breakwater pier where the storage vessels will be moored to dolphins and aligned together. Each vessel will be enclosed by a breakwater pier. There will be a sea bass /phonetic/ for oil loading and unloading at a site roughly 800 meters to the northeast of this fill-in area.

Each storage vessel will have a capacity of about 700,000 kiloliters, and comparison of its size with Japan's largest building Nopoville Sunshine and the largest tanker built to date in Japan, the Esso-Atlantic, is given in a separate table.

Table



(1)	全長 (m)	(2) 幅 (m)	吃水 (m) (3)
白島の貯蔵船 (4)	397	82	22.7 (5) (深さ25.4)
(6) サンシャイン・ビル	(7) (高さ) 210	(8) (長さ) 71.2	(9) (幅) 43.6
Esso-Atlantic (重量トン・約50万トン) (10)	406.6	71.0	31.2

Key:
1. overall length (m)
2. width (m)
3. draught (m)
4. storage vessel at Shirojima
5. (depth 25.4)
6. Sunshine Building
7. (height)
8. (length)
9. width
10. Esso-Atlantic (deadweight tonnage about 500,000 tons)

In this manner, a single storage vessel will have about the same length as the largest tanker ever built in Japan, but it will have a broader width making it better strengthwise. Because its shape is rectangular, it will have 1.4 times more capacity making it more economically advantageous. Where the outer wall of tankers of the past were constructed out of a single plate of steel, this storage tank will have double wall construction throughout its sides, bottom, and partition walls, leaving only the upper section in single wall construction. This vessel will be filled with seawater in a safety measure to be employed.

The mooring dolphins will serve to safely moor these storage vessel under adverse conditions such as bad weather. These mooring dolphins will be giant caissons, their length, width, and height respectively will be 22, 26, and 30 meters, and they will be made of concrete and each weigh about 9,000 tons. Construction and installation are presently proceeding on these mooring dolphins and the various breakwaters which comprise the mooring site along with the caissons of this four-pier project, and there is expected to be greater experience in the design and construction of the piers and abutments which go into these piers. More specifically, these caissons will be produced at a caisson yard in nearby North Kyushu-shi and will be towed by tug through roughly 8 kilometers of the open sea to its site where it is expected to be installed with a precision of ± 10 centimeters.

This plan is based on the premise of adequate comprehensive technology including shipbuilding engineering and marine engineering, and Japan possesses world ranking technology in each area, and this plan attracted great interest at the international meeting of ECOR (the Engineering Committee on Ocean Resources) which is an international society on marine affairs, at its last meeting (in London in April 1981).

Tanker Fleet, Tanker Storage of Stockpiled Oil

Needless to say that there will be a need for increasing stockpiling capabilities even while permanent national stockpiling bases are being constructed. One of the ideas advanced in this direction is tanker storage. This is a concept well suited to a seafaring country such as Japan, and this project was started in 1978. At the present, there are 26 VLCC, and one ULCC for a total of 27 vessels which store 7.5 million kiloliters.

What concerned the Petroleum Public Corporation where tanker storage was concerned was, understandably, the safety aspect, and some very stringent safety standards were established as conditions for use of such vessels. At the same time, an "oil storage tanker control mechanism" was set up in order to promote thorough safety control, and all efforts at safety are being promoted. There are 13 tankers moored in Nagasaki-ken harbor which has been an anchorage in the past and 7 vessels in the newly established anchorages at Usukine Bay, Tsukumi Bay, and Saiki Bay in Oita-ken with another 7 vessels in the Iojima peripheral area.

It is said that presently there are 88 Japanese box VLCC operating, and this means that roughly a third of this total is being used as national stockpiling tankers. Japan, fortunately, managed to survive last fall's Iranian-Iraqi conflict without undue strain on its economic status, and it was the "soundless weight" of this oil stockpiling which made it possible to avoid this confusion. When one looks from the deck of one of these vessels of the other tankers deployed throughout the bay, there is a feeling that one is seeing the safety assurance of a new Japanese generation being manifested in line with the flow of the times.

Construction of permanent stockpiling bases has also gotten into the groove so that tanker stockpiling is expected to peak out at about 10 million kiloliters and then gradually decrease. It may be said that the mobility of these tankers is being fully exploited in these stockpiling activities and they are playing very important roles.

The Coming Underground Stockpiling Mode

The idea of storing oil in underground rock formations is nothing new having developed about 40 years ago in Sweden, and it is said that there are presently underground storage facilities with a total capacity of several ten million kiloliters in northern Europe.

This storage mode is practiced not only in northern Europe but in the United States, France, and West Germany, and experience over the past 30 years has demonstrated its superior safety, environmental soundness, and economics according to the evaluations.

Underground storage facilities in Japan which have been used in the past include the facility constructed by the old naval technology branch which is still being used. There are small tanks embedded underground, but there have been no large underground storage tanks actually built, and nearly all of the large capacity storage tanks have been the above-ground type.

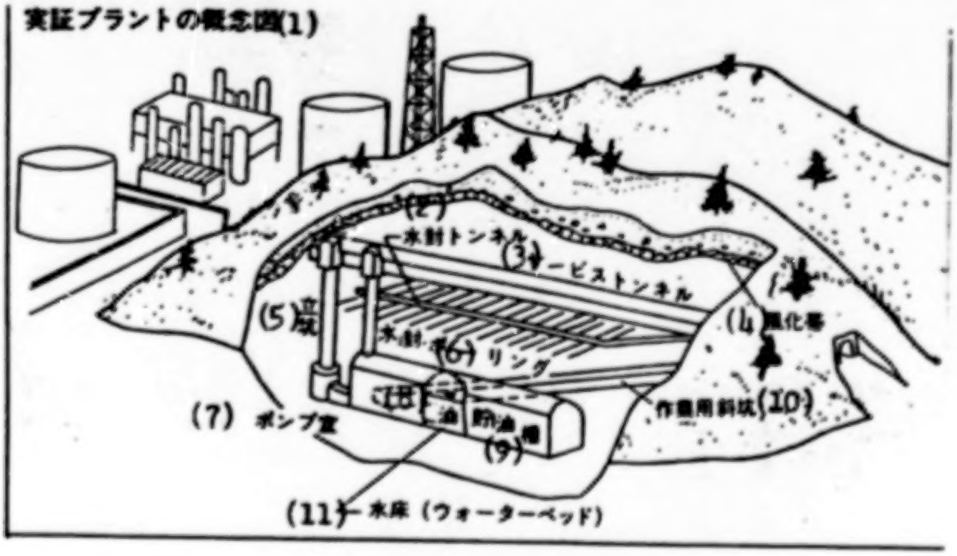
A storage base using this above-ground tank mode must be located near a good port and provide wide and level ground. Such a location is also suited to industrial belts or agricultural land, and its acquisition is becoming more difficult year by year.

With this background it becomes necessary to increase oil stockpiling capability as well as to plan effective utilization of the limited space available in Japan. To this end there is need to hasten development and utilization of a safe and economical storage method in addition to the above-ground tank method.

Because of this situation, the Resources and Energy Agency has since JFY 1981 been promoting survey research on technological development of underground oil stockpiling, assembling learned academicians and experienced specialists from private industry.

Types of underground storage of oil utilizing rock formations included the lateral boring water seal type, lateral boring Makitate [literally winding] type, and rigid hole Makitate type. In JFY 1977 1) a large-scale oil stockpiling base model of 5 million kiloliter capacity for crude oil was proposed, an all country survey for suitable sites was conducted, and a number of potential sites were selected. In addition, 2) seismic observations were made in actual tunnels in line with earthquake resistant research, experiments using models to simulate earthquakes with an earthquake machine were conducted, and studies on behavior during earthquakes and on vibration characteristics were conducted.

Conceptual Diagram of Demonstration Plant



Key:
1. conceptual diagram of demonstration plant
2. water seal tunnel
3. service tunnel
4. aeration zone
5. vertical shaft
6. water seal boring
7. pump chamber
8. oil
9. oil storage tank
10. water bed (water bed)

The demonstration plant will have a capacity of 25,000 kiloliters and is comprised of a main excavation for the oil storage tank, service tunnel, dry pump room, vertical shafts for introduction and removal, and working tunnel for transporting mined earth. The storage tank which is the focal point of this system will be 15 meters wide, 20 meters high, and 112 meters long, and the top of the excavation will be 42 meters below sea level. The characteristic features are the water seal tunnels and water seal borings which will be deployed to cover the upper section of the oil storage tank in a rib bone affair. Introducing water through these tunnels and borings will create an artificial water table and is planned to complete the water tightness and prevent lowering of the natural water table. At the present time, construction of this demonstration plant has progressed to the extent that the working tunnels, water seal tunnels, and service tunnels have been completed, and the excavation for the main body is targeted to be completed by the end of June (see photo). At the same time, the stability of the rock formation, performance of the water seal, and effects on the environment will be studied through instruments installed in the two observation borings as one phase of this demonstration experiment, and studies on design values and the like will be conducted.

Future plans involve the completion of studies on the stability of the rock formation and the performance of the water seal. In addition, when construction of the demonstration plant is completed, inspections such as leak tests and tests involving water operation will be conducted after which oil-in will be performed (about January or February of 1982), and experiments in crude oil transport are planned.

At the time the safety and economics of underground tanks in the rock formation in Japan are demonstrated by this plant, it will represent a great step forward in the realization of actual large-scale underground oil stockpiling bases.

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